

1 Applicant: Everett Simons  
2 For: Robust, Low-Resistance Elastomeric Conductive Polymer Interconnect

1 1. An elastomeric device for electrically interconnecting two or more  
2 components, comprising,  
3 an elastomeric matrix having one or more outer surfaces; and  
4 one or more electrically conductive pathways through said matrix, wherein at  
5 least a portion of the electrical pathway contains a material that is an electrically  
6 conductive liquid at the elastomeric device's operating temperature.

1 2. The device of claim 1, further comprising one or more electrically  
2 conductive contact pads, wherein at least a portion of said pad is in electrical contact with  
3 one or more of said pathways.

1 3. The device of claim 1, wherein the electrically conductive liquid is a low  
2 melting point metal or alloy.

1 4. The device of claim 3, wherein said metal is Gallium.

1 5. The device of claim 3, wherein said alloy contains one or more metals  
2 selected from the group of metals consisting of Gallium, Indium, Bismuth, and Tin.

1 6. The device of claim 1, wherein said pathways are anisotropic and  
2 comprise between about 2 to 50% magnetic particles by volume of said elastomeric  
3 matrix.

1 7. The device of claim 1, wherein said matrix comprises one or more  
2 elastomers which retains most of its elasticity over a temperature range of between at  
3 least 20° C to 75° C.



1           11.     An elastomeric device for electrically interconnecting two or more  
2 components, comprising a matrix of electrically insulating elastomer that retains most of  
3 its elasticity over a temperature range of at least 20°C to 75°C, containing an array  
4 columns that are electrically conductive liquid over at least the upper range of the use  
5 temperature of the device.

1           12.     The device of claim 11, further comprising one or more electrically  
2 conductive contact pads in electrical contact with said columns.

- 1           13.     A method for making an elastomeric device for electrically  
2     interconnecting two or more components, comprising the steps of:  
3           creating an array of low melting point metallic columns on a carrier; and  
4           laterally encapsulating said array in an electrically isolating elastomeric matrix.

1           14.     A method for making an elastomeric device for electrically  
2     interconnecting two or more components, comprising the steps of:  
3           creating an array of openings in an electrically isolating elastomeric matrix; and  
4           filling the openings with a material that is an electrically conductive liquid over at  
5     least the upper range of the use temperature of the device.

14. A method for making an elastomeric device for electrically  
interconnecting two or more components, comprising the steps of:  
creating an array of openings in an electrically isolating elastomeric matrix; and  
filling the openings with a material that is an electrically conductive liquid over at  
least the upper range of the use temperature of the device.

1           15.     An elastomeric device for thermally interconnecting two or more  
2 components, comprising a matrix of electrically insulating elastomer that retains most of  
3 its elasticity over a temperature range of at least 20°C to 75°C, containing an array of  
4 columns that include thermally conductive liquid metal over at least the upper range of  
5 the use temperature of the device.